

# Sewer Venting Pilot Study to Minimize Vapor Intrusion Potential Aboard MCB Camp Lejeune, NC

Presented by
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## **Objective**



## Present an overview of HP57 Vapor Intrusion Investigation, Sewer Venting Pilot Study, and Lessons Learned

- History of IR Site 88
- Details of Sewer Venting Pilot Study
- Recent Results
- Path Forward



## Site 88 Background

1995

• Underground Storage Tank Removal

## Former Dry Cleaning Facility (Former Building 25)

- Operated 1940s to January 2004 (PCE used from 1970s)
- PCE and degradation products in soil and groundwater
- ◆ Base-wide VI Evaluation initiated in 2007
  - Evaluated sites within 100 feet of VOC contamination
  - HP57 included in Phase III due to potential preferential vapor transport (underground utilities)



1998

Focused Remedial Investigation

1999 2001 Source Area Pilot Studies

2003-2004 Supplemental Site Investigation

2008

Remedial Investigation

20u6-2010 Soil mixing removal actions, ISCO/ERD pilot studies

2011

 Vapor intrusion (VI) investigation, Phase I Limited Site Assessment, site-wide groundwater sampling

2012

• VI Mitigation System Installation, Draft FS

2014

Baseline geophysical mapping, site-wide groundwater sampling

2015 2016  Tracer Study, Sewer Ventilation Pilot Study, Draft Final FS

2017-2018 Proposed Remedial Action Plan (PRAP),
 Record of Decision, Remedial Design

## **HP57 Background**

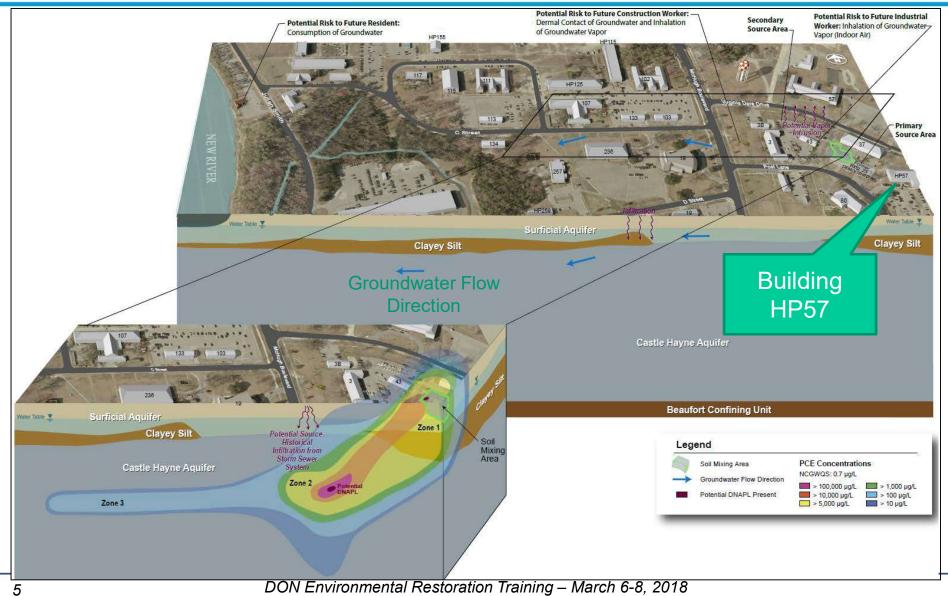


- Upgradient of Site 88
- Sewer utilities connect Former Building 25 to Building HP57
- Trichloroethene (TCE) periodically detected in indoor air
  - Above North Carolina Vapor Intrusion Screening Levels (NC VISLs)
  - Above EPA Region 9 Accelerated Response Level
  - IA concentrations did not correlate with soil gas to indicate VI
- Additional investigation initiated to determine source
  - Uncapped pipe (connected to the sewer)
    discovered in wall space of a mechanical room
    - Sealed by Base plumbing December 2014
- Follow-up sampling confirmed indoor air concentration reductions



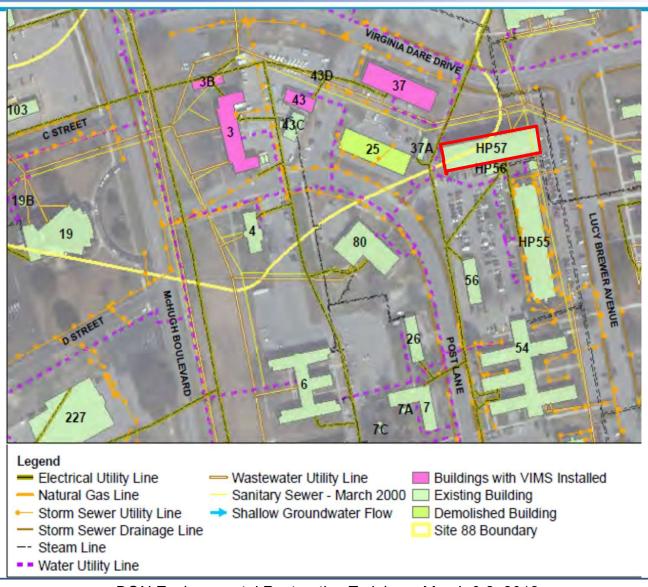
## **Site 88 - Former Base Dry Cleaners**





## **Existing Underground Utilities**





## **HP 57 Phase III and Supplemental VI Sampling**







Mix of sand and sandy clay with areas of clay

Subslab Soil Gas Sample Location

Outdoor Air Sample Location
Indoor Air Sample Location

Sewer Line

Sample with TCE concentration above the USEPA Region 9 Accelerated Response Level J - Analyte present. Value may or may not be accurate or precise

ug/m³ - micrograms per cubic meter

SG - soil gas IA - indoor air

TCE - trichloroethene

U - Analyte not detected

Subslab Soil Gas - NC Residential VISL TCE - 14 ug/m<sup>3</sup>

Indoor Air - NC Residential VISL (ug/m³) TCE - 0.42 ug/m³

USEPA Region 9 Accelerated Response Action Level TCE - 2 ug/m<sup>3</sup>

USEPA Region 9 Urgent Response Action Level TCE 6 ug/m³

IR88-SG20/IR88-IA16 collected in the Company Office; IR88-SG19/IR88-IA15 collected in the Lounge;

## What are the TCE Screening Levels?

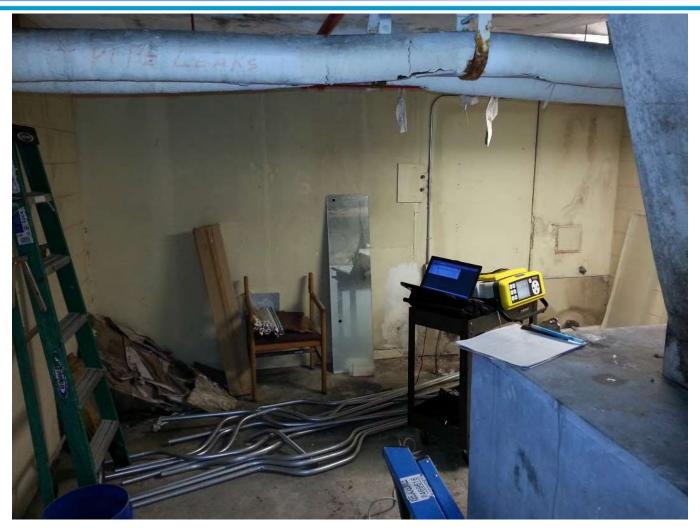


	EPA VISL (10 <sup>-6</sup> , or THQ=1)	North Carolina Indoor Air Screening Level (10 <sup>-5</sup> , or THQ=0.2)	EPA Region 9 Accelerated Response Action Level	EPA Region 9 Urgent Response Action Level
Date Established	March 2012	October 2013	July 2014	July 2014
Residential	0.48 ug/m <sup>3</sup>	0.42 ug/m <sup>3</sup>	2 ug/m <sup>3</sup>	6 ug/m <sup>3</sup>
Non-Residential (8-hour workday)	3 ug/m <sup>3</sup>	1.8 ug/m <sup>3</sup>	8 ug/m <sup>3</sup>	24 ug/m <sup>3</sup>

- IA testing completed October 2014
- Hapsite Investigation completed November 2014
  - Uncapped sewer pipe temporarily sealed with spray foam
- Pipe permanently sealed December 2014
- All screening levels are non-cancer risk

## **HP57 Interior Photos**

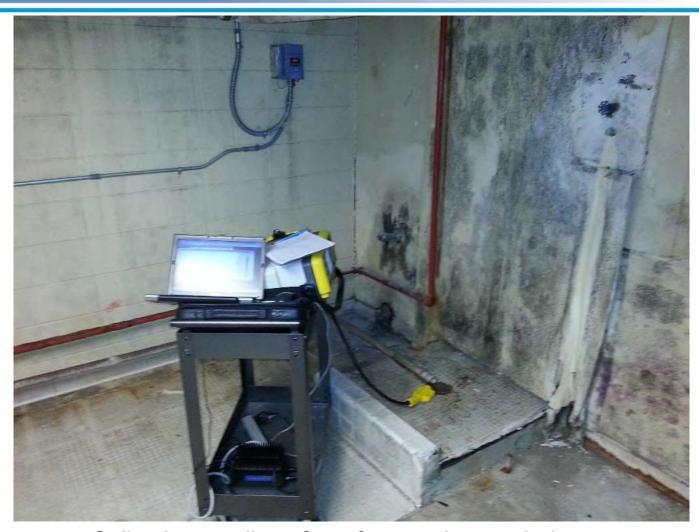




HP57 Southeast Mechanical Room

## **HP57 Interior Photos**

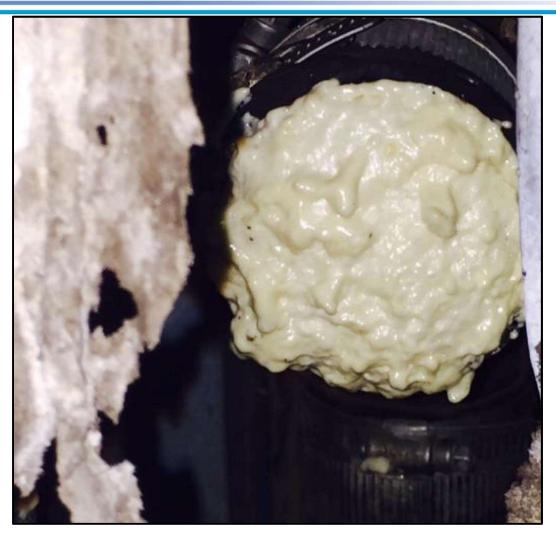




Collecting readings from former shower drain

## **HP57 Interior Photos**



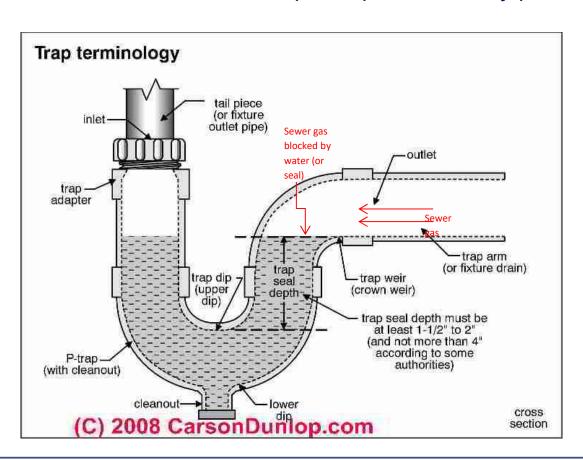


Temporary seal for pipe

## **HP57 Pilot Study – Objectives**



- Assess whether ventilation of the sewer line can:
  - ◆Reduce VOC concentrations in the sewer line to below NC VISLs
  - ◆Reverse the flow of vapor to potential entry points inside Building HP57



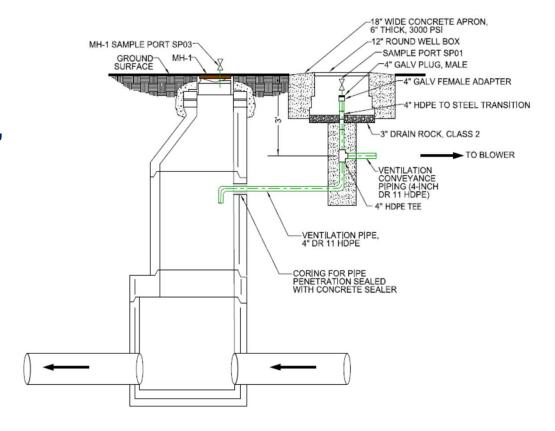
#### What is a P-Trap?

A P-trap is designed to prevent sewer gas from passing through a wastewater line by creating a water barrier. If the trap dries out, sewer gas can travel up from the sewer line into a building through the plumbing fixture, like a toilet, sink, or floor drain.

## **Sewer Venting System Design**



- **◆**4" ventilation pipe from the sewer
- **♦**Connected to skid mounted, blower, 240 cfpm, 25" H2O
- **♦**Blower exhaust vented above roofline
- ◆Vapor monitoring port installed to test vacuum and concentrations.



VENTILATION PIPING AT MANHOLE-1 CONCEPTUAL PROFILE VIEW

NOT TO SCALE

## **Costs Associated with System**

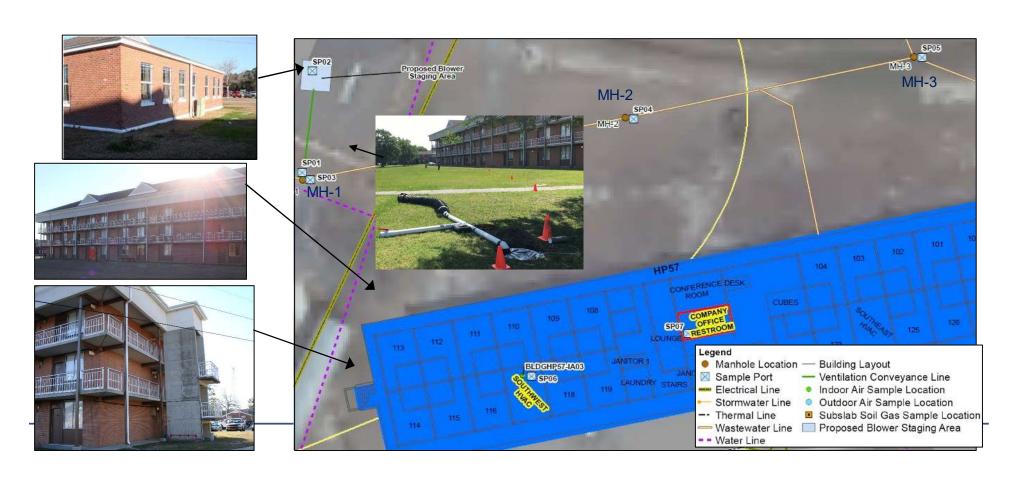


- Phase I Testing: \$20k
  - **◆**Baseline testing within sewer line and building plumbing
  - ◆Used to evaluate optimal location of ventilation piping in sewer
- Phase II Capital Costs: \$67k
- Phase II System Installation and Startup: \$20k
- Phase II Post-Startup Quarterly Monitoring (1 year): \$20k
  - **◆**Discharge gas/vapor sampling
  - ◆Manhole vapor sampling
  - **◆Indoor and outdoor air sampling**
- Estimated Annual O&M: \$5-10k

#### **Phase 1 Field Activities**

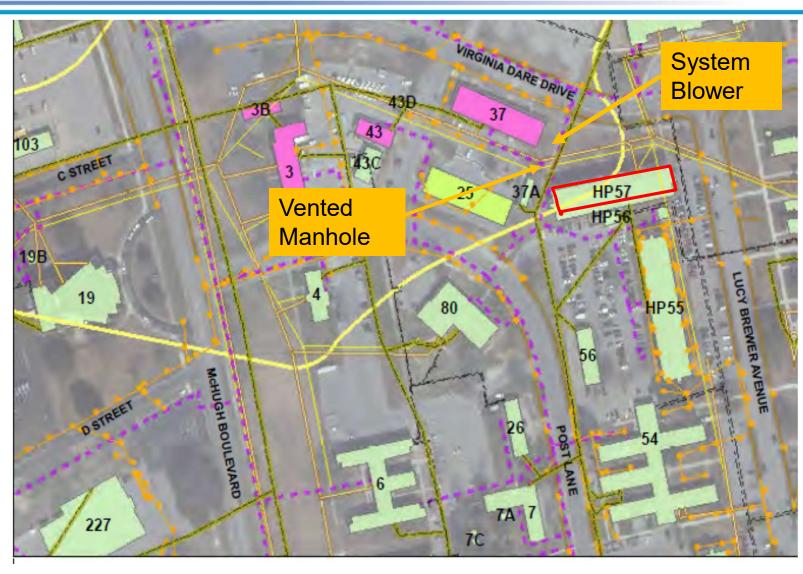


- Confirmation sampling at manhole locations (July 2016)
  - ◆ Results indicated source likely related to Site 88
  - ◆ Venting at MH-1 successfully reduced PCE and TCE concentrations



## **Area Map**





#### **Phase 2 Field Activities**



- Baseline sampling, startup, and post-startup performance monitoring (October 2016)
  - Manhole sampling
  - Southwest HVAC room plumbing
  - Company office plumbing
  - ◆ Baseline samples confirmed presence of PCE, TCE, and cis-1,2-DCE in sewer line and HP57 plumbing
    - Highest sewer line concentrations observed at Manhole 1 (located closest to Site 88 source area)
  - ◆ COCs not detected in indoor air above screening levels during baseline or after startup
  - ◆ Post-startup monitoring conducted 36 hours after startup:
    - Manhole 1 PCE decreased from 900 to 100 μg/m³
    - ◆ SW HVAC plumbing PCE from 260 to 3.8 µg/m³
    - Company office plumbing PCE from 440 to 10 μg/m<sup>3</sup>







#### **HP57 Pilot Study – Continued Performance Monitoring**



#### **Blower Operation Monitoring**

	Date	Pressure (Inches WC Vacuum)	Flow Rate (cfm)	Outdoor Air VOCs (ppm)	Outdoor Air Hydrogen Sulfide (ppm)	Exhaust VOCs (ppm)	Exhaust Hydrogen Sulfide (ppm)
Baseline	10/29/2016	0	0	0.0	0.0	0.0	0.0
Q1 Monitoring	12/21/2016	34	NM	1.0	0.0	1.3	0.0
Q2 Monitoring	3/21/2017	31	261	0.0	0.0	0.0	0.0
Q3 Monitoring	6/27/2017	31	296	0.0	NM	0.8	NM
Q4 Monitoring	9/5/2017	30	252	0.1	0.0	5.5	0.0

\*Ametek Rotron EN757M72XL with 3 hp EXP motor;

Max. Amps @ 60Hz: Volts 208-230/415-460 3-Phase

cfm - cubic feet per minute

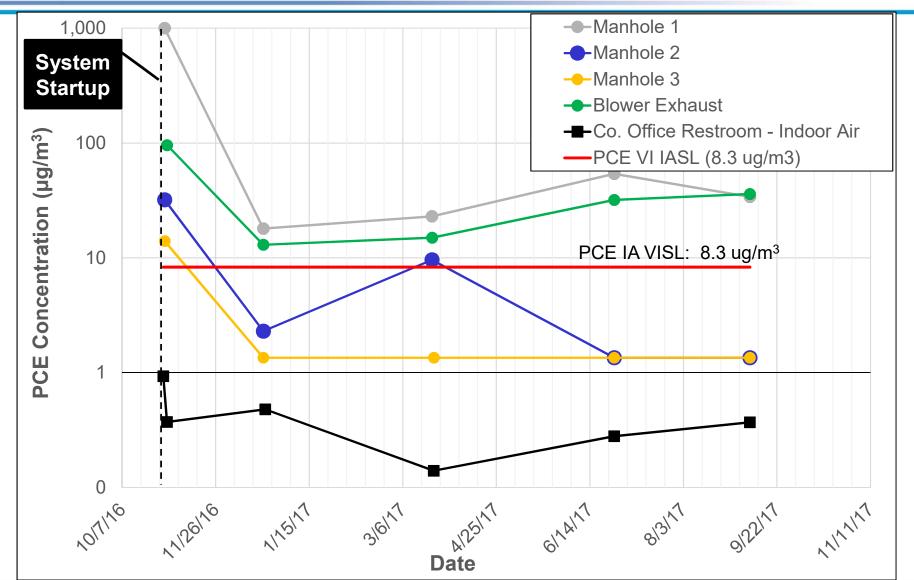
NM - not measured

ppm - parts per million

WC - water column

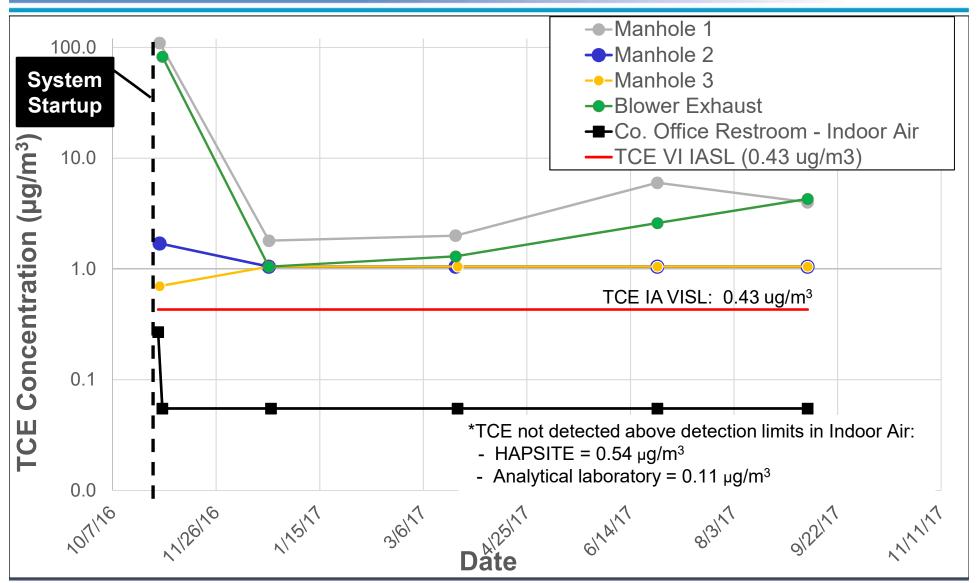
## **HP57** Pilot Study Update – Performance Monitoring – PCE





## HP57 Pilot Study Update – Performance Monitoring – TCE





#### **HP57 Pilot Study – Performance Monitoring Update**



#### September 2017 (Q4) Results Summary

- ◆ Manhole 1
  - ◆ Highest observed PCE (34 µg/m³) ~ 100x decrease
  - ♦ Only TCE detection (4 μg/m³) ~ 100x decrease
- ◆ Manhole 2
  - ◆ No PCE or TCE detected in Q3 or Q4
- ◆ Manhole 3
  - ◆ PCE and TCE not detected since startup
- ◆ Blower discharge vapor sampling
  - PCE and TCE reductions observed, similar to Manhole 1
  - First TCE detection since startup (4.3 μg/m³)
- ◆ Company office restroom indoor air
  - $\bullet$  PCE continues to be detected at low concentrations (0.37 μg/m3), ~ 10x below the VISL (8.3 μg/m3)
  - ◆ TCE not detected



Exhaust



## **HP57 Pilot Study Summary**



#### Summary of Pilot Study Findings

- ◆ PCE and TCE confirmed in sewer vapor manholes and within plumbing of Building HP57
  - Source likely related to Site 88 source area
- ♦ Venting successfully reduced PCE and TCE concentrations by up to 100x

#### Pilot Study Conclusion

◆ Permanent sewer ventilation system is capable of mitigating sewer vapor intrusion at Building HP57

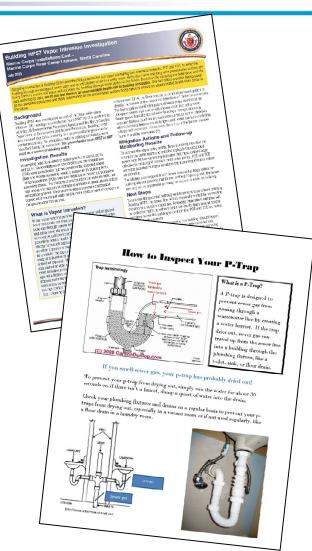
#### Path Forward

- **♦** Continued operation of sewer ventilation system
- ♦ Will be incorporated into ROD and Remedy for Site 88
- ◆ Ongoing sampling events to verify system effectiveness

#### **Risk Communication**



- Indoor air sampling activities coordinated with building occupants throughout initial investigation and pilot study
- Fact Sheet prepared and disseminated after source of indoor air contaminants identified
- Fact Sheet additionally posted in company office
- Pilot Study activities briefed at a quarterly Restoration Advisory Board Meeting



## You did great! Right?



- Source of CVOCs in a residential building identified (uncapped sewer pipes) and eliminated
- Utilized conservative Region 9 TCE Screening Levels
- Fact Sheet prepared and provided to building occupants
- Regulatory partners engaged in decision making process
- Successful Pilot Study to vent sewer pipe

## Reality



- Camp Lejeune currently subject to a Vapor Intrusion Public Health Assessment by ATSDR
- Community Assistance Panel concerns
- Congressional Inquiry
- Communication challenges with occupants (uniformed military so frequent turnover in occupants)

## **Take Away Messages**



- Decision to pursue NFA may be warranted. However, make sure it makes sense!
- If implying indoor source, identify that source and remove it if appropriate.
- Think outside the box. Older installations may have undergone multiple renovations. Interior renovation may exacerbate VI conditions.
- Don't assume building occupants properly inspect their plumbing, or perform other maintenance.
- Don't assume military construction projects didn't take shortcuts.

## **Knowledge Check**



Chlorinated Solvents are detected in indoor air but Lines Of Evidence indicated soil VI is not occurring. Building occupants should not be using CVOCs. What's your next step?



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#### **Contacts and Questions**



#### **Points of Contact**

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#### **Questions?**